

amendment various claims have been amended and new claims 18-19 have been added. Thus, claims 1-8 and 10-19 are pending in the application. The Examiner's rejections are traversed below.

Specification Amendment

Applicant notes that the specification amendment at page 1, lines 28 and 29 was not entered. Applicants do not have a substitute for this amendment.

Rejection Under 35 U.S.C. § 112

In item 3 on page 2 of the Office Action the Examiner rejected claims 1-8 and 10 under 35 U.S.C. §112, second paragraph as indefinite. By this Amendment, the claims have been amended in response to the comments raised by the Examiner in an effort to clarify the claims without narrowing the claims within the meaning of Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 62 USPQ 2d 1705 (Supreme Court, 2002).

Applicants do not understand the Examiner's comment that the term "for" in line 1 of claim 1 renders the housing and subassemblies not claimed. Applicants do not understand the Examiner's position regarding this point inasmuch as the applicants are clearly attempting to claim an arrangement which cooperates with, and acts on, a housing and electrical subassemblies. Nevertheless, the applicants have attempted to amend claim 1 so that its recitation is more closely related to that of claim 10 which was not objected to on the same basis.

In summary, it is submitted that claims 1-8 and 10 meet the requirements of 35 U.S.C. §112.

Rejection Under 35 U.S.C. §102 Based On U.S. Patent 5,886,296 to Ghorbani et al.

In item 4 on page 3 of the Office Action, the Examiner rejected claims 1-4 and 7-8 as anticipated by the Ghorbani et al. patent.

Ghorbani et al. is directed to an outside telecommunications equipment enclosure having a hydrophobic vent. Figure 3 which is an exploded view of a hydrophobic vent, is described from column 2, line 50 to column 4, line 47. As described therein, the filtering of dust particles and liquids as done in two stages. In the first stage, dust particles are filtered by a screen 34

which is positioned on an exterior side of the enclosure. The screen is a wire mesh made of plastic, aluminum or stainless steel. In the second stage a filter sheet 38 including hydrophobic material 40 prevents liquids from passing through. The filter sheet 38 maintains the position of the circular hydrophobic material 40 in the correct position with respect to circular openings 30 in the enclosure.

It is clear that the dust particle screen 34 is outside of the enclosure. Further, the filter sheet 38 has no filtering functionality other than by virtue of the hydrophobic material 40 which only filters liquids. See column 3, lines 31-32 which state that this material is used "to prohibit liquids from passing therethrough."

In contrast to Ghorbani, the present claimed invention recites:

at least one water-repellent membrane filter arranged in an air inlet
of the housing for surface filtration of dirt particles from cooling air
flowing into the housing for cooling the electrical subassemblies.

Thus, the claimed filter performs both a dirt particle filtration function and a water filtration function. Further, the use of the claimed water-repellent filter to filter dust particles has an advantage because a filter cake grows on the surface of the membrane filter due to the presence of both dirt particles and liquid. When the cake becomes thick, it falls off the membrane automatically. As a result, there is a relatively long time between cleanings of the membrane filter. In contrast, in Ghorbani, dust particles will become stuck in the mesh of the screen 34 and prevent air from flowing through the screen. As a result, the screen must be cleaned after a relatively short period of time, thereby increasing maintenance costs.

In addition to the above differences between Ghorbani et al. and the present claimed invention, it is noted that the present claimed invention operates in a manner which is significantly different from the device shown in Ghorbani et al. In summary, for the above reasons, it is submitted that claim 1 patentably distinguishes over the prior art. Claims 4 and 7-8 depend from claim 1 and include all of the features of claim 1 plus additional features which were not taught or suggested by the prior art. Therefore, it is submitted that these claims also patentably distinguish over the prior art.

Rejection Based on U.S. Patent 5,901,034 to Fuglister

In item 6 on page 3 of the Office Action the Examiner rejected claims 1 and 7 as anticipated by the Fuglister patent. The Examiner referenced diaphragm 55 (see Figures 5 and

8) and took the position that the subassembly and housing were not claimed.

The Fuglister patent is directed to an electronic instrument with a two part housing surrounding a dusttight printed board with at least one electronic component. Figure 5 illustrates a diaphragm 55 which acts as an air permeable, dust separating and water-repellent valve which leads water vapor present in the housing interior or formed there, outward, but not water from outside into the housing interior (column 6, lines 21-25). Thus, the diaphragm 55 is permeable to water vapors in a directionally dependent manner so that the diaphragm prohibits water from entering the housing while permitting water vapor in the housing to get out of the housing. Thus, Fuglister is totally unrelated to the claimed cooling arrangement and is not dealing with filtering dirt particles and water from air being used to cool electrical subassemblies. Specifically, Fuglister does not teach or suggest:

A cooling arrangement for an apparatus having a housing containing electrical subassemblies, comprising:

at least one water-repellent membrane filter arranged in an air inlet of the housing for surface filtration of dirt particles from cooling air flowing into the housing for cooling the electrical subassemblies;
and

at least one cooling device to build up an airflow in the housing and to lead the filtered cooling air, which is heated up because of flowing through the electrical subassemblies, out of the housing through at least one air outlet.

Thus, Fuglister, which relates to removing water from the vicinity of an electronic component is totally unrelated to the present invention which removes dirt and water from incoming air which is used to cool electrical subassemblies. Therefore, it is submitted that claim 1 patentably distinguishes over the prior art.

Claim 7 depends from claim 1 and includes all of the features of that claim plus additional features which are not taught or suggested by the prior art. Therefore, it is submitted that claim 7 also patentably distinguishes over the prior art.

Rejection Based on U.S. Patent 6,008,454 to Kawakita

In item 6 on page 3 of the Office Action the Examiner rejected claims 1, 7 and 8 under 35 U.S.C. §102 as anticipated by Kawakita. The Examiner makes reference to a filter 16. Kawakita is directed to a storage box for electronic control units. Referring to the abstract and the description of figure 2, a storage box employs an inner box surrounded by an outer box. The inner box houses an electronic control unit and air circulates in a space between the two boxes to cool the electronic control unit. A hole in the inner box is sealed with a filter 16 which allows air to pass but not water. The filter 16 allows cooling air to flow to electronic control unit 20 through cooling air circulation space 15. Because there is an outer box surrounding the inner box, there is no problem with dust particles intruding into the inner box. This is prevented by the outer box and not by the filter 16. Further, Kawakita does not teach or suggest active cooling of electrical subassemblies but instead relies on a passive cooling system. In particular, referring to claim 1, Kawakita does not teach or suggest:

“...at least one water-repellent membrane filter arranged in an air inlet of the housing for surface filtration of dirt particles from cooling air flowing into the housing for cooling the electrical subassemblies; and

at least one cooling device to build up an airflow in the housing and to lead the filtered cooling air, which is heated up because of flowing through the electrical subassemblies, out of the housing through at least one air outlet.”

Therefore, it is submitted that claim 1 patentably distinguishes over Kawakita. Claims 7 and 8 depend from claim 1 and include all of the features of that claim plus additional features which are not taught or suggested by the prior art. Therefore, it is submitted that claims 7 and 8 also patentably distinguish over the prior art.

The Prior Art Rejection Based On IBM and U.S. Patent 5,395,411 to Kobayashi

In item 7 on pages 3-4 of the Office Action, the Examiner rejected claims 1-5, 7-8, 10-14 and 16-17 under 35 U.S.C. §103 as unpatentable over the cited IBM Technical Disclosure Bulletin in view of Kobayashi.

The IBM Technical Disclosure Bulletin discloses a ventilation system for data processing

systems which isolates incoming air from heated exhaust air in stacked elements of the system frame to prevent cumulative preheating of electrical elements to be cooled. The air enters openings 10 in a front door of a cabinet and passes through areas in an inclined direction defined by members 11 to a vertical chimney 12 and then up to the top of a cabinet and out through an optional filter 13. Modules 14 are cooled by the air flow. A fan 16 may be used to force air in a direction opposite to that described above.

The Kobayashi patent is directed to a filter for air cleaning which includes a layer of water repellent fiber and a layer in which fiber bundles comprise aggregates of water-absorbent fibers. The filter is used for cleaning outside air to be taken into factories, buildings, etc. particularly to remove salt particles contained in the outside air in coastal areas. There is no disclosure in Kobayashi that the filter disclosed is suitable for surface filtration of dirt particles as is done in the present claimed invention. It is also submitted that one of ordinary skill would not have been lead to employ the Kobayashi filter in the IBM system. First of all, it is noted that the filter 13 in IBM is noted as "optional" and therefore, apparently not important to the disclosed product. Secondly, there are numerous air flow openings in the IBM system so that the provision of the Kobayashi filter in the position of 13 of IBM would not provide an effective apparatus for removing water and dirt particles from cooling air flowing into the housing as set forth in the present claimed invention. Further, it is noted that the IBM system is a ventilation system for data processing systems and clearly is not meant to be placed in a hostile environment. Therefore, it is submitted that claims 1-5, 7-8, 10-14 and 16-17 patentably distinguish over the prior art.

Prior Art Rejection Based on Ghorbani et al. and Kobayashi

In item 8 on page 5 of the office Action, the Examiner rejected claims 1-5, 7-8, 10-14 and 16-17 under 35 U.S.C. §103 as unpatentable over Ghorbani et al. in view of Kobayashi. As discussed above, there is no disclosure that Kobayashi provides a filter which is capable of surface filtration of dirt particles as is done by the present claimed invention. Therefore, it submitted that one of ordinary skill in the art would not have been lead to replace the dust particle screen 34 of Ghorbani and the filter sheet 38 including hydrophobic material 40 in Ghorbani with the Kobayashi filter since there is no teaching that Kobayashi filters both dirt particles and water from the air. Therefore, it is submitted that claims 1-5, 7-8, 10-14 and 16-17 patentably distinguish over the prior art.

New Claims 18 and 19

In the Office Action, claim 15 was objected to as being dependent from a rejected base claim. The features of claim 15 relate to the features of reversing air flow in order to clean the water repellent and dust particle filter. Claim 15 has not been rewritten in independent form. However, claims 18 and 19 have been added to recite certain features of the present invention including the feature of reversing the air flow in order to clean the combination filter. Therefore, it is submitted that these claims patentably distinguish over the prior art.

Summary

It is submitted that none of the references, either taken alone or in combination, teach the present claimed invention. Thus, claims 1-8, and 10-19 are deemed to be in a condition suitable for allowance. Reconsideration of the claims and an early notice of allowance are earnestly solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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on September 4, 20 02
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND the following claims:

1. (TWICE AMENDED) [An] A cooling arrangement for [cooling] an apparatus having a housing containing electrical subassemblies [arranged in a housing, said arrangement having] , comprising:

at least one water-repellent membrane filter arranged in an air inlet of the housing for [the] surface filtration of dirt particles from cooling air flowing into the housing for cooling the electrical subassemblies[.]; and

at least one cooling device to build up an airflow in the housing and to lead the filtered cooling air, which is heated up because of flowing through the electrical subassemblies, out of the housing through at least one air outlet.

2. (TWICE AMENDED) The cooling arrangement as claimed in claim 1, [which includes] further comprising an air guide device [being] arranged respectively underneath and/or above the electrical subassemblies, to guide the filtered cooling air through one electrical subassembly in each case.

3. (TWICE AMENDED) The cooling arrangement as claimed in claim 1, [which includes] further comprising an air guide device arranged respectively underneath and/or above the electrical subassemblies, to shield the [subassembly] electrical subassemblies.

4. (TWICE AMENDED) The cooling arrangement as claimed in claim 1, [which includes] wherein said at least one cooling device comprises a motor-driven fan wheel [as the cooling device].

5. (TWICE AMENDED) The cooling arrangement as claimed in claim 4, [which includes] further comprising a control device to control the motor speed of [the] said at least one cooling device as a function of the temperature in the interior of the housing and/or of the temperature of the cooling air flowing in.

6. (TWICE AMENDED) The cooling arrangement as claimed in claim 5, wherein [the] said control device controls [the] said at least one cooling device in such a way that the direction

of the air flow in the housing is reversed, so that cooling [airflows] air flows in through the at least one air outlet and is led out through the membrane filter, the membrane filter being freed of deposited dirt particles by the cooling air flowing out.

7. (TWICE AMENDED) The cooling arrangement as claimed in claim 1, wherein the air inlet is arranged in [the] a side and/or bottom area of the housing in such a way that the cooling air flowing in acts on the undersides of the electrical subassemblies.

8. (TWICE AMENDED) The cooling arrangement as claimed in claim 1, wherein the at least one air outlet for leading the filtered and heated cooling air out is arranged in [the] an upper and/or side area of the housing.

9. CANCELLED

10. (ONCE AMENDED) A base station for a system selected from a mobile telephone system and an access network system, said base station having a housing containing electrical subassemblies, said housing having at least one air inlet and at least one air outlet, and an arrangement for cooling the electrical subassemblies, said arrangement comprising:

at least one water-repellent membrane filter being arranged in [each] said at least one air inlet of the housing for the surface filtration of dirt particles from the cooling air flowing in [the] said at least one air inlet[,] and

at least one cooling device to create an airflow in the housing to lead the filtered cool air, after being heated up because of flowing through the electrical subassemblies, out of [the] said at least one air outlet.

11. (ONCE AMENDED) A base station according to claim 10, [which includes] further comprises an air guide device being arranged respectively adjacent each electrical subassembly to guide the filtered cooling air through one electrical subassembly in each case.

12. (ONCE AMENDED) A base station according to claim 10, [which includes] further comprising an air guide device [being] arranged adjacent each electrical subassembly to shield the electrical subassembly.

13. (ONCE AMENDED) A base station according to claim 10, [which includes] wherein

said at least one cooling device comprises a motor-driven fan wheel [as the cooling device].

14. (ONCE AMENDED) A base station according to claim 13, [which includes] further comprising a control device to control a motor speed of the motor-driven fan wheel as a function of the temperature in the interior of the housing and the temperature of the cooling air flowing into the at least one air inlet.

15. (ONCE AMENDED) A base station according to claim 14, wherein [the] said control device controls [the] said at least one cooling device in such a way that the direction of the airflow in the housing can be reversed, so that cooling [airflow] air flowing in through the at least one air outlet is directed through [the] said at least one water-repellent membrane filter to free [the filter] said at least one water-repellent membrane filter of deposited dirt particles.

16. (ONCE AMENDED) A base station according to claim 10, wherein the at least one air inlet is arranged in an area adjacent [the] a bottom area of the housing so that the cooling air flowing in through the at least one air inlet acts on the underside of the electrical subassemblies.

17. (ONCE AMENDED) A base station according to claim 10, wherein the at least one air outlet is arranged in an upper region of the housing.

Please ADD the following claims:

18. (NEW) An apparatus comprising:

a housing containing at least one electrical subassembly, said housing having at least one air inlet and at least one air outlet;

at least one combination water repellent and dirt particle filter arranged in the at least one air inlet to filter cooling air flowing into the housing to cool the at least one electrical subassembly;

at least one cooling device to cause the cooling air to flow through the at least one electrical subassembly and through the at least one air outlet; and

a control device controlling said at least one cooling device to reverse the direction of the air flow in the housing, so that the cooling air flows in through the at least one air outlet, through said at least one combination water repellent and dirt particle filter and through the at least one air inlet to free said at least one combination water repellent and dirt particle filter of deposited dirt particles.

19. (NEW) A base station for a system selected from a mobile telephone system and an access network system, comprising:

a housing containing electrical subassemblies, said housing having at least one air inlet and at least one air outlet;

at least one combination water repellent and dirt particle filter arranged in the at least one air inlet of said housing to filter cooling air flowing in the at least one air inlet;

at least one cooling device to cause the filtered cooled air to flow through the electrical subassemblies and out of the at least one air outlet; and

a control device controlling said at least one cooling device to reverse the direction of the air flow in said housing so that the cooling air flows in through the at least one air outlet and is directed to said at least one combination water repellent and dirt particle filter to free said at least one combination water repellent and dirt particle filter of deposited dirt particles.